

What is Claimed is:

1. A fluidized bed reactor (10) for mixing a plurality of materials and transforming a chemical property of the materials to establish a desired product comprising:

5 a hollow, elongated, vertically oriented reactor housing (12) for confining the reaction of the materials as they are transformed;

a central gas and/or solids inlet (22) proximate the bottom of a reaction zone within the housing (12) for directing gas parallel to the vertical axis of the housing to maintain the raw materials in suspension; and

10 a plurality of peripheral gas inlet jets (24) positioned at least two elevations along the elongated dimension of the housing (12) for introducing gas at an angle to the elongated dimension of the housing to promote mixing of the entrained materials in suspension.

15 2. The fluidized bed reactor (10) of claim 1 wherein the reactor housing (12) has a conical section (16) in its reaction zone with the reduced diameter of the cone at its lower end interfacing with the central gas inlet (22).

20 3. The fluidized bed reactor (10) of claim 2 including a residue collection housing (18) mating at one end with the reduced diameter section (16) of the reactor housing and having an inclined lower wall (20) for directing residue from the reaction process to a residue collection port (32).

25 4. The fluidized bed reactor (10) of claim 3 including a feeder (34) positioned at the residue collection port (32) for removing the residue from the collection housing (18).

5. The fluidized bed reactor (10) of claim 4 wherein the feeder (34) is a screw or rotary feeder.

6. The fluidized bed reactor (10) of Claim 4 wherein the feeder (34) continuously removes the residue from the reactor during operation.

7. The fluidized bed reactor (10) of claim 3 including a sparger (30) surrounding at least a portion of the collection housing (18) for introducing

gas within the collection housing (18) to maintain residue below a given size in suspension and directed back into the reaction zone while enabling residue agglomerates above the given size to drop towards the collection port (32).

8. The fluidized bed reactor (10) of claim 7 wherein the sparger (30) gas is introduced at a downwardly directed angle to the central axis of the collection housing (18).

9. The fluidized bed reactor (10) of claim 3 wherein the incline of the lower wall (20) of the collection housing (18) is designed so that the gravitational forces on the residue above the given size will overcome the wall friction and travel to the collection port (32).

10. The fluidized bed reactor (10) of claim 1 wherein the peripheral gas jets (24) are directed at a downward angle to a line perpendicular to the central axis of the reactor housing (12).

11. The fluidized bed reactor (10) of claim 1 wherein gas from the central gas inlet (22) is introduced into the reaction zone without passing through a solid or perforated diffuser section.

12. The fluidized bed reactor (10) of claim 7 wherein approximately 30% of the fluidizing gas is introduced through the central gas inlet (22), approximately 65% of the fluidizing gas is introduced through the peripheral gas inlets (24), and 5% and the fluidizing gas is introduced through the sparger (30).

13. The fluidized bed reactor (10) of claim 1 including control valves (27) for individually controlling the quantity of gas passing through the respective peripheral jets (24).

14. The fluidized bed reactor (10) of claim 1 wherein the peripheral gas jet (24) inlets includes a plurality of gas jets at each of said elevations respectively positioned around the circumference of the reactor housing (12).

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15. The fluidized bed reactor (10) of claim 14 wherein the peripheral gas jets (24) at each elevation are equidistantly positioned around the circumference of the reactor housing (12).

5 16. The fluidized bed reactor (10) of claim 14 wherein the peripheral gas jets (24) at each elevation are not aligned with the jets (24) at the other elevations.

10 17. The fluidized bed reactor (10) of claim 4 wherein the feeder (34) removes the residue from the reactor in batches during operation.

18. The fluidized bed reactor (10) of claim 1 wherein the peripheral gas jets (24) are positioned at at least three elevations.

19. The fluidized bed reactor (10) of claim 1 wherein the pressure drop across the peripheral gas jets (24) is at least thirty percent of the pressure drop across the reaction zone.

15 20. The fluidized bed reactor (10) of claim 7 wherein the pressure drop across the sparger (30) is at least thirty percent of the pressure drop across the reaction zone.

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